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LDEF Systems Special Investigation Group Overview*

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INTRODUCTION

The Systems Special Investigation Group (Systems SIG), formed by the LDEF Project Office to perform post-flight analysis of LDEF systems hardware, was chartered to investigate the effects of the extended LDEF mission on both satellite and experiment systems and to coordinate and integrate all systems related analyses performed during post-flight investigations. The Systems SIG published a summary report in April, 1992 titled "Analysis of Systems Hardware Flown on LDEF - Results of the Systems Special Investigation Group" that described findings through the end of 1991. The Systems SIG, unfunded in FY 92 and FY93, has been funded in FY 94 to update this report with all new systems related findings. This paper provides a brief summary of the highlights of earlier Systems SIG accomplishments and the describes tasks the Systems SIG has been funded to accomplish in FY 94.

PREVIOUS ACCOMPLISHMENTS

The hardware of interest to the Systems SIG included an enormous diversity of components. The management of this hardware was facilitated by the division into four major engineering disciplines: mechanical, electrical, thermal, and optical. In order to assist the post-flight testing and analysis of LDEF hardware, the Systems SIG developed a set of standardized test plans for each of these four discipline areas (ref. 1). These plans were designed to be used by either the Systems SIG or the experimenters in their testing and analysis of systems hardware. These test plans are available through the LDEF Archive Office and have been used in assisting in the post-flight inspection of the retrieved Hubble Space Telescope hardware.

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Beginning with on-site support of the de-integration of LDEF at Kennedy Space Center (KSC), Systems SIG personnel have supported the testing of active system related testing of experiments either at KSC, experimenter facilities, or at Boeing Defense & Space Group (BD&SG) facilities. BD&SG was funded by the Systems SIG to provide the necessary personnel and facilities required to meet the Systems SIG objectives.

To distribute the ongoing results of all LDEF related investigations to the spacecraft community, the Systems SIG authored and distributed a semi-quarterly newsletter titled "LDEF Newsletter". Because of the newsletter's popularity, the LDEF Project Office assumed responsibility for the continuation of this activity.

An LDEF Optical Experiment Database was created (using Filemaker Pro database software) that provides for quick and easy access to available experimenter optics related findings. The database contains a file for each of the LDEF experiments that possessed optical hardware. Each file contains various fields that identify the optical hardware flown, describes the environment seen by that hardware, summarizes experimenter findings and lists references for additional information. This database has been updated by Materials SIG funding to include findings from the 2nd LDEF Post-Retrieval Symposium held June 1992.

In April 1992 the Systems SIG distributed a report titled "Analysis of Systems Hardware Flown on LDEF - Results of the Systems Special Investigation Group" (ref. 2). This 300 page report summarized the major Systems findings through 1991. The report contained sections describing LDEF and the LDEF mission, brief summaries of the various LEO environments seen by LDEF, all major findings discussed by the four engineering disciplines, paper copy of the Optical database, and over 140 references for further details. This document is also available by contacting the LDEF Archival Office.

FY 1994 SYSTEMS SIG TASKS

The LDEF Systems SIG has been funded to accomplish the following tasks in FY94: 1) Collect and review all new LDEF systems related data generated by the various LDEF experimenters, 2) Update the April 1992 Systems SIG report and the Optics database, 3) Support the development of the LDEF Database and Archival effort, and 4) Identify specific concerns from ongoing spacecraft programs and address these concerns with LDEF data. The following paragraphs describe these tasks in more detail.

Task 1 - Collection and Review of All New LDEF Systems Related Data. Data to be reviewed includes the 2nd and 3rd LDEF Post-Retrieval Symposiums and the LDEF Materials Results for Spacecraft Applications Conference. In addition, a literature search will be performed and LDEF principal investigators contacted to obtain additional relevant information.

Task 2 - Updating the Summary Report and the Optics database. The results from Task 1 will be used to update the Summary Report and Optics database with new findings and lessons learned. The updated report will then be distributed to the spacecraft community using the LDEF Newsletter distribution list. Updated electronic copies of the Optics database will be distributed to the approximately 150 personnel currently possessing the database. Both the new report and database will also be available from the LDEF Archival Office.

Task 3 - LDEF Contamination Study. The objective of this task, performed by NASA Goddard Space Flight Center personnel, is to compile and analyze LDEF contamination data. The compiled data will then be used to model portions of LDEF in an attempt to determine the accuracy of contamination modeling of orbiting spacecraft. A final report summarizing the results of this task will then be released. A summary of the contamination report will be included in the update Systems report described in Task 2.

Task 4 - Support Development of the LDEF Database and Archival Effort. All LDEF systems hardware and data will be identified and located with this information forwarded to the LDEF Archival Office.

Task 5 - Determine On-going Spacecraft Concerns and Address with LDEF Data - The Systems SIG will identify specific issues on programs such as Hubble Space Telescope, Space Station, Earth Orbiting Satellite, Tropical Rainfall Measurement Mission, and Ballistic Missile Defense Organization (BMDO) missions and attempt to address these concerns with information generated from LDEF data. This information will be forwarded on to the Space Environments and Effects (SE&E) Program.

REFERENCES

- 1) Dursch, H.W et. al., "*LDEF Systems Special Investigation Group Investigation Plan*", Boeing Defense & Space Group, February 1990.
- 2) Dursch, H. W. et. al., "*Analysis of Systems Hardware Flown on LDEF - Results of the Systems Special Investigation Group*", NASA CR 189628, April 1992.

